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This Instrument becomes a Micrometer on the same Principles, tho' I was obliged to alter its Structure from that used with the Telescope, which was first invented by Mr. *Gascoign*, improved by Mr. *Townly*, and described by Dr. *Hook*, as appears by *Numb.* 25. and 29. of Mr. *Oldenburg's Philosophical Transactions*; to which Description, if I did not acknowledge my self beholden, were to do great Injustice to the Authors of that excellent Invention.

The Thermometer is capable of the like Improvement, but then the Screw of the Micrometer must be much longer, and the Microscope will require a longer Tube, to the End the Body of the Observer be not too near the Thermometer, and by its warm Effluvia deceive his Judgment in the Air's Temperature.

*Canterbury, May 2.*  
1698.

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#### IV. *Part of a Letter from Dr. William Mufgrave, Fellow of the College of Physicians, and R. S. to Dr. Sloane, concerning the Cause of the Necessity of Breathing.*

**Y**OU know, how difficult it has been thought, to account for the principal Use of Respiration: Nothing is more evident, than that breathing is, from the very Moment of our Birth, perpetually necessary to Life; yet nothing more in the Dark, than the true Cause and Reason of that Necessity.

Dr. *Thruston* asserts the chief Use of Respiration, to consist, in maintaining a due Motion of the Blood.

*Officium*

*Officium illud [Respirationis præcipuum] Nos in eo maxime positum arbitramur, quod Sanguinis Motui inserviat, eumq; tueatur.* pag. 6. Edit. Lond. 1670.

And, to make out his Assertion, he urges (among other Arguments of less note) That this Opinion, easily explains, the Manner of Sudden Death, by Strangling; by drowning; and by violent Catarrhs; supposing Death, and the Stagnation of the Blood in the Lungs, Right Ventricle of the Heart, &c. to arise, in all these Cases, from the Stoppage of the Breath.

*Etmuller* embraces the same Opinion; and, in Defence of it, alledges the same Argument: Indeed they both depend on it, as highly probable and convincing.

Tho', I think, the Opinion is very Rational; I cannot say it appears such, from the Argument now produc'd; which, upon Examination, will be found too liable and obnoxious to bear so great a Proportion of the Proof.

By Dr. *Thruston's* own Concession, (pag. 173.) Men that are Hang'd, may, with good Reason, be supposed to die, partly, from the mutual Commerce between the Head and Heart, being now intercepted. The remarkable Lividness of their Faces, with the extraordinary Distention of the Jugulars, in their several Branches above the Ligature, argue, they die, in a great Measure, *Apoplectical*.

Now, whatever share the Interruption of this mutual Commerce has, in killing the Man; so much the less Reason have we to impute his Death, and the Stagnation of Blood in his Lungs, &c. to the Stoppage of his Breath.

Nor is the Second Case (that of Sudden Death by Drowning) without Exception: For here, the Water rushing, after an unusual Manner, into the Lungs, may

be suspected so to affect them, as to occasion Death, tho' not by stopping the Circulation.

And, as to Suffocation from a Catarrh, instances of this Kind, with Anatomical Observations on them, have not (to me at least) occur'd, sufficient to prove, what was intended by this Argument.

Wherefore, that a Noble Proposition may not want Evidence, and that the Opinion, my Learned Countryman has so ingeniously defended, may for ever obtain, I pitch't on the following Experiment as Luciferous, and, I hope it will appear decisive of the Matter.

I took a large, middle-aged, healthy Dog; and, having freed the *Trachea* from the adjacent Parts, cut it off just beneath the *Pomum Adami*, and turn'd the loose End outward. After some time allowed him to recover the present Concern; with a Cork, got ready on purpose, I stopt up the *Trachæa*, binding it close to the Stopple. Some few, but violent Struggles succeeded; in which the Sternum was raised, as in the deepest Inspiration; and thus he died. From the Stoppage of his Breath, to the last Motion I could discern in any Part of his Body, was, from a Watch, observed to be the Space of Two Minutes. I then immediately threw open the *Thorax*; where I saw the Blood Stagnating in the Lungs; the *Arteria Pulmonaris*, the Right Ventricle of the Heart, with its appending Auricle, and the Two great Trunks of the *Cava*, distended with Blood, to a Degree excessive: The *Vena Pulmonaris*, Left Auricle and Ventricle of the Heart, in a Manner Empty; not containing (as near as I can guess) more than One Spoonful of Blood.

This Experiment proves, That the Respiration promotes the Passage of the Blood thro' the Lungs; and that in Bodies full of vigorous Blood, it is, on this Account of perpetual Necessity.

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This Acceleration of the Blood in that Passage, seems to be the principal use of Respiration ; no other is of such Consequence to Life, or stands in Competition with it.

*Exon, May 9.*

1698.

*V. An Account of what happened on Syringing warm Water into the Thorax of a Bitch. By Dr. William Musgrave, Fellow of the College of Physicians, and R. S.*

ON *Thursday*, the 21<sup>st</sup> of *June*, 1683. I syringed ʒiv. of warm Water into the Right Side of a Greyhound Bitch ; which caused a great Rigour (especially in the Hinder Parts) a Shortness of Breath ; a Heat, or burning in the Flesh ; she looked heavy, was unwilling to rise or stand long on her Feet ; those Symptoms wore off by Degrees, so that in a Weeks time she appeared as well as ever.

On the 2<sup>d</sup> of *July* following (that is Eleven Days after the former Experiment) I injected ʒxvj. of warm Water into the Left Side of the Thorax of the same Greyhound, after which she was extremely hot, and short Breath'd, I felt a violent throbbing in her Heart, but the Rigour was not so great as in the first Experiment ; she recovered this also in the Space of a Week.

About the 15<sup>th</sup> *ditto*, I injected ℥ijß of Warm Water into one Side of the Thorax, and ℥ß. into the other Side of the same Bitch ; the Symptoms attending it were (as in the former Experiments) a burning in the Flesh,  
and